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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/928,430	08/14/2001	Kazuyuki Nitta	2001-1143A	8121

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EXAMINER
LEE, SIN J

ART UNIT	PAPER NUMBER
1752	4

DATE MAILED: 11/06/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/928,430	Applicant(s) NITTA ET AL.	
	Examiner Sin J Lee	Art Unit 1752	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 August 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *3* .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless -
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in-
> (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or
> (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al (5,876,900) in view of Ohsawa et al (6,440,634 B1).

In Example 10 (see Table 1 in col.29), Watanabe et al teach a chemically amplified positive resist composition comprising 80 pbw of *Polymer 4*, which structure is shown at the bottom of col.25 and 26, 2 pbw of *a photoacid generator*, 2 pbw of a divinyl ether compound, *CL.1*, which structure is shown at the middle of col.27 and 28, and 0.06 pbw of *triethanolamine* (present tertiary alkanol amine compound of claim 10). When converted based on 100 pbw of Polymer 4, it would give 2.5 pbw of a photoacid generator, 2.5 pbw of the divinyl ether compound, and 0.075 pbw of the triethanolamine.

Watanabe's Polymer 4 teaches present component (A) because in the first repeating unit of the polymer, the hydrogen of the phenolic hydroxyl group is substituted by $-CH(CH_3)-O-CH_2CH_3$ (alkoxyalkyl group) and in the second repeating unit of the polymer the hydrogen of the phenolic hydroxyl group is substituted by $-C(=O)-O-C(CH_3)_3$ (tertiary alkoxycarbonyl group).

Watanabe's divinyl ether compound, CL.1, teaches present component © of claim 5 having the formula $X(-O-CH=CH_2)_n$ (in the formula n would be 2, and X would be an 2-valent organic residue).

Therefore, Watanabe teaches present inventions of claims 1, 2, 5, 9, and 10 except for the present component (D). Ohsawa et al teaches (col.2, lines 4-21 and col.14, lines 34-36) that a carboxylic acid compound can be added to a chemical amplification positive working resist composition in order to improve dissolution characteristics. Ohsawa furthermore teaches (col.52, lines 37-59) *salicyclic acid* (present aromatic carboxylic acid of claims 7 and 8) as one of two *preferred* examples for their organic acid derivative and also teaches that their organic acid

derivative is *especially preferably* added in an amount of upto 1 part per 100 parts by weight of the solid in the resist composition (assuming one uses 1 part of the salicyclic acid per 100 parts by weight of the solid in Watanabe's resist composition in his Example 10, this would give 0.84 pbw of the salicyclic acid per 80 parts of Polymer 4, which in turn would give 1.05 pbw of the salicyclic acid per 100 parts of Polymer 4). Based on Ohsawa's teaching, it would have been obvious to one of ordinary skill in the art to add a carboxylic acid compound such as salicyclic acid (in the amount of 1.05 pbw based on 100 parts of Polymer 4) to Watanabe's chemically amplified positive resist composition in order to improve dissolution characteristics of the composition as taught by Ohsawa. Therefore, Watanabe in view of Ohsawa would render obvious present inventions of claims 1, 2, 5, and 7-10.

With respect to present claims 3 and 4, as discussed above, Watanabe uses Polymer 4 in their Example 10. Since Polymer 4 is surely made of thousands of polymer chains (synthesis of polymer never results in only a single polymer chain) wherein each polymer chain has alkoxyalkyl acid-dissociable group as well as tertiary alkoxycarbonyl acid-dissociable group, one can say for example, one of those thousands of polymer chain would meet the description of the present first resin (A1) of claim 3 and another of those thousands of polymer chain would meet the description of the present second resin (A2). Also, one of those thousands of polymer chain meeting the description of the present first resin (A1) and another of those thousands of polymer chain meeting the description of the present second resin (A2) would inherently have a certain weight proportion in the mixture, and it is the Examiner's position that the weight proportion of

those polymer chains would inherently fall within the present range of 2:8 to 9:1 especially since the present range is being claimed very broadly. Therefore, Watanabe in view of Ohsawa would render obvious present inventions of claims 3 and 4.

With respect to present claim 6, as discussed above, Watanabe uses CL.1 as their vinyl ether compound in Example 10. The compound CL.1 meets more general formula (I) for their vinyl ether compound shown in col.7, lines 28-40; in the formula (I), A would be $-C_6H_4-C(CH_3)(CH_3)-C_6H_4-$ (see col.8, lines 45-48), R^{14} would be an ethylene group, n would be 1, and m would be 2. Watanabe teaches equivalence of CL.1 and $H_2C=CH-O-CH_2CH_2-O-CH=CH_2$ (since in the formula (I) A can be $-CH_2CH_2-$, n can be 0, and m can be 2). Since the prior art teaches the equivalence of these two compounds as their vinyl ether compounds of the formula (I), it is the Examiner's position that it would have been obvious to one of ordinary skill in the art to use $H_2C=CH-O-CH_2CH_2-O-CH=CH_2$ as Watanabe's vinyl ether compound in their Example 10 with a reasonable expectation of achieving a chemically amplified positive resist composition having high resolution. Since in $H_2C=CH-O-CH_2CH_2-O-CH=CH_2$ present X would be $-CH_2CH_2-$,which is a residue derived from a molecule of CH_3-CH_3 (which is an aliphatic hydrocarbon compound) by eliminating 2 hydrogen atoms, Watanabe in view of Ohsawa would render obvious present invention of claim 6.

4. Claims 11 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Watanabe et al (5,876,900) in view of Ohsawa et al (6,440,634 B1) as applied to claim 1 above, and further in view of Blakeney et al (5,985,507).

Watanabe et al in view of Ohsawa et al is discussed in Paragraph 3 above. Watanabe teaches (col.24, lines 47-56) that their resist composition is spin coated onto a silicon wafer, prebaked at 80° to 120°C to form a resist film, exposed to actinic radiation and baked at 70° to 120°C for 30 to 200 seconds (post-exposure baking), and developed with an aqueous base solution. Therefore, Watanabe in view of Ohsawa teaches present invention of claim 11 except for the post-development heat treatment step (present step (e)). Blakeney et al teach (col.2, lines 7-10 and col.10, lines 9-14) performing post-development heat treatment or bake in order to increase the adhesion of positive working resist composition and chemical resistance of the composition to etching solutions and other substrates and also to *improve the resist thermal flow temperature*. Based on Blakeney's teaching, it would have been obvious to one of ordinary skill in the art to perform a post-development heat treatment in Watanabe's invention in order to increase the adhesion of Watanabe's positive working resist composition and chemical resistance of the composition to etching solutions and other substrates and also to improve the resist thermal flow temperature as taught by Blakeney. Therefore, Watanabe in view of Ohsawa and further in view of Blakeney would render obvious present invention of claim 11. Also, since Watanabe in view of Ohsawa and further in view of Blakeney teaches present method of claim 11, it is the Examiner's position that Watanabe's patterned resist layer after the post-development heat treatment would inherently exhibit the diminishing change in a dimension by increasing the temperature by an amount not exceeding 15 nm per degree centigrade of the temperature range as

presently recited in claim 12. Therefore, Watanabe in view of Ohsawa and further in view of Blakeney would render obvious present invention of claim 12.

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sin J. Lee whose telephone number is (703) 305-0504. The examiner can normally be reached on Monday-Friday from 8:30 am EST to 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ms. Janet Baxter, can be reached on (703) 308-2303. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9311 for after final responses or (703) 872-9310 for before final responses.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0661.

S. Lee
October 31, 2002

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